

CLAIMS

1. An air assist fuel injector, comprising:
 - a solenoid having a metallic core, an armature, and a solenoid coil for generating a magnetic field in said metallic core to actuate said armature;
 - a poppet attached to said armature; and
 - a single piece metallic body that forms part of a said metallic core of said solenoid, said body having an impact surface upon which said poppet repeatedly impacts during operation of said injector.
2. The air assist fuel injector of claim 1, said body having a relative permeability of at least 100.
3. The air assist fuel injector of claim 2, said relative permeability being at least 300
4. The air assist fuel injector of claim 1, said body having a hardness of at least 80 HRB.
5. The air assist fuel injector of claim 4, said hardness being at least 92 HRB.
6. The air assist fuel injector of claim 1, said body having a relative permeability of at least 100 and a hardness of at least 80 HRB.
7. The air assist fuel injector of claim 6, said , said body having a relative permeability of at least 100 and a hardness of at least 32 HRC.
8. The air assist fuel injector of claim 1, said body being located directly adjacent said armature such that the armature impacts said body when it is actuated by said solenoid.
9. The air assist fuel injector of claim 1, said body include a bearing surface for said poppet.

10. The air assist fuel injector of claim 1, said body being formed from one of the following families of stainless steels:

AISI 416 stainless steels;

AISI 430 stainless steels; and

AISI 440 stainless steels.

11. The air assist fuel injector of claim 10, said body being one of said AISI 416 stainless steels.

12. The air assist fuel injector of claim 11, said body being AISI 41600 stainless steel.

13. The air assist fuel injector of claim 10, said body being one of said AISI 440 stainless steel.

14. The air assist fuel injector of claim 13, said body being 44004 stainless steel.

15. The air assist fuel injector of claim 13, said body being one of said 44020 stainless steel.

16. The air assist fuel injector of claim 1, said body being a ferromagnetic stainless steel.

17. The air assist fuel injector of claim 1, further comprising a spring that biases said armature away from said body, said body having a channel in which said poppet reciprocates during operation of said injector, said channel receiving said spring.

18. The air assist fuel injector of claim 1, further comprising a sleeve attached to said body, said sleeve receiving said armature.

19. The air assist fuel injector of claim 18, said sleeve being attached to said body with a weld.

20. The air assist fuel injector of claim 18, further comprising a cap for receiving liquid fuel and gas, said sleeve receiving said cap.
21. The air assist fuel injector of claim 1, said armature having a passageway for conveying liquid fuel and gas.
22. The air assist fuel injector of claim 1, said poppet having a passageway for conveying liquid fuel and gas.
23. The air assist fuel injector of claim 1, the injector being configured such that said poppet opens in a direction away from said injector to discharge fuel and gas from the injector.
24. The air assist fuel injector of claim 1, a portion of said body being hardened, said portion being at least one of said impact surface and a bearing surface of said body.
25. The air assist fuel injector of claim 1, a portion of said body including a solid phase coating thereon, said portion being at least one of said impact surface and a bearing surface of said body.
26. An air assist fuel injector, comprising:
 - a solenoid having a metallic core, an armature, and a solenoid coil for generating a magnetic field in said metallic core to actuate said armature;
 - a poppet attached to said armature; and
 - a single piece stainless steel body that forms part of a said metallic core of said solenoid, said body having an impact surface upon which said poppet repeatedly impacts during operation of said injector, said body having a permeability of at least 100, a hardness of at least 80 HRB, and a corrosion resistance greater than that of 12L14 steel.
27. The air assist fuel injector of claim 26, said body being AISI 416 stainless steel.

28. The air assist fuel injector of claim 26, said body being AISI 440 stainless steel.
29. The air assist fuel injector of claim 26, said body being AISI 430 stainless steel.
30. The air assist fuel injector of claim 26, said body being located directly adjacent said armature such that the armature impacts said body when it is actuated by said solenoid.
31. The air assist fuel injector of claim 26, said body include a bearing surface for said poppet.
32. The air assist fuel injector of claim 26, further comprising a spring that biases said armature away from said body, said body having a channel in which said poppet reciprocates during operation of said injector, said channel receiving said spring.
33. The air assist fuel injector of claim 26, further comprising a sleeve attached to said body, said sleeve receiving said armature.
34. The air assist fuel injector of claim 33, said sleeve being attached to said body with a weld.
35. The air assist fuel injector of claim 33, further comprising a cap for receiving liquid fuel and gas, said sleeve receiving said cap.
36. The air assist fuel injector of claim 26, said armature having a passageway for conveying liquid fuel and gas.
37. The air assist fuel injector of claim 26, said poppet having a passageway for conveying liquid fuel and gas.

38. The air assist fuel injector of claim 26, the injector being configured such that said poppet opens in a direction away from said injector to discharge fuel and gas from the injector.

39. An air assist fuel injector comprising:

a solenoid having a metallic core, an armature, and a solenoid coil for generating a magnetic field in said metallic core to actuate said armature;

a poppet attached to said armature; and

a single piece metallic body that forms part of said metallic core of said solenoid, said body having an impact surface upon which said poppet repeatedly impacts during operation of said injector, said metallic body being formed of a material having a relative permeability sufficient to actuate said armature when said solenoid coil is energized, said material also being sufficiently hard to absorb impact of said poppet and said armature without substantial deformation.